

REMARKS

This Amendment responds to the Notice of Drawing Inconsistency with Specification.

In the notice, an inconsistency was indicated between the drawings and the Brief Description of the Drawings in the specification. In particular, the notice stated that while Fig. 3 is contained in the drawings, it is not listed in the Brief Description of the Drawings in the specification. As indicated above, the specification at page 3, line 22 and page 3, line 34 have been amended to resolve this inconsistency.

Applicants respectfully bring the Patent Office's attention to the amendment filed June 14, 2001, a copy of which is enclosed along with a stamped postcard. As noted in the June 14, 2001 Amendment, the identical changes were made to the specification. Applicants respectfully submit that no matter has been added.

Thus, it now appears that the application is in condition for reconsideration and issuance.

In the event that this paper is not timely filed within the currently set shortened statutory period, Applicants respectfully petition for an appropriate extension of time. The fees for such extension of time may be charged to our Deposit Account No. 02-4800.

In the event that any additional fees are due with this paper, please charge
our Deposit Account No. 02-4800.

Respectfully submitted,

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Date: May 3, 2004

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Patent
Attorney's Docket No. 003300-688

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)
Alan G. JACK et al.) Group Art Unit: 2834
Application No.: 09/684,988) Examiner: J. Gonzalez
Filed: October 10, 2000)
For: INDUCTION MACHINE STATOR)
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AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In response to the Office Action dated March 14, 2001, please amend the above-identified application as follows.

IN THE SPECIFICATION:

Kindly add the following paragraph at page 3, line 22:

-- FIG. 3 illustrates the connection of the power supply to the stator sections.--

Kindly replace the paragraph beginning at page 3, line 34 with the following:

-- The yoke sections 4 and 5 are physically phase shifted by 180° electrical ± an angle that is related to skew (not shown). Their electrical supplies are also shifted by

180° electrical. FIG. 3 illustrates the electrical supplies connected to stator sections 1 and 2 and mutually phase shifted 180° electrical. Further, the stator sections 2 and 3 are separated by a small air gap 10 so as to reduce the mutual influence of the magnetic fields in the two stator sections 2 and 3.--

IN THE CLAIMS:

Please amend claims 1 and 11 as follows:

1. (Amended) A stator for an electrical induction machine, comprising an even number n of stator sections (2, 3) at different axial positions, each section having a plurality of circumferentially separated, radially extending teeth (6, 7) and each tooth having a single winding,

wherein the stator sections are mutually phase shifted by substantially $360^\circ/n$ electrical \pm an angle related to skew,

and wherein each of the stator sections is arranged to receive electricity from an electrical supply such that a first set of $n/2$ of the stator sections will receive electricity that is shifted by 180° electrical relative to electricity received by a second set of $n/2$ of the stator sections.

11. (Amended) An electrical induction machine having a rotor and a stator, wherein the stator comprises an even number n of stator sections (2, 3) at different axial positions, each section having a plurality of circumferentially separated, radially extending teeth (6, 7) and each tooth having a single winding, wherein the stator sections are

mutually phase shifted by substantially $360^\circ/n$ electrical \pm an angle related to skew and wherein each of the stator sections is arranged to receive electricity from an electrical supply such that a first set of $n/2$ of the stator sections have their electrical supplies shifted by 180° electrical relative to electricity received by a second set of $n/2$ of the stator sections.

REMARKS

Claim 1-20 are pending. By this amendment, claims 1 and 11 are amended, the specification is amended and Figure 3 is added without introduction of new matter. Reconsideration and allowance based upon the above amendments and following remarks are respectfully requested.

The Office Action objects to the drawings under 37 C.F.R. §1.83(a) for allegedly not showing every feature of the invention specified in the claims. In particular, the Office objected that the single winding, electrical supplies defined in claims 1 and 2 are not shown. In response, filed concurrently herewith is a Request for Examiner's Approval of Drawing Changes which requests that a new Figure 3 be added to the application. The new Figure 3 illustrates the connection of the single winding electrical supplies to the stator sections, as described in the specification on page 3, lines 33-37. To accommodate the addition of this figure, the specification has been amended to refer to and include a description of Figure 3. Applicants respectfully submit that no new matter has been introduced by the submission of Figure 3 and the added description.

The Office Action also objects to Figure 1 based on an allegation that "teeth 7 points to an empty space." Applicants' respectfully disagree with this allegation because it is quite clear from FIG. 2, which shows the cross section view indicated in FIG. 1, that reference numeral 7 does not point to an empty space. Rather, the teeth 7 are part of a stator section 3, and the teeth 6 are part of a different stator section 2. The stator section 3 is phase shifted 180° electrical in relation to the stator section 2, which corresponds to 30° physical, that is, half the angle of a separate unit or segment 8. Thus in FIG. 1, the teeth 7 can be seen in-between the teeth 6.

In view of the foregoing, approval of the drawing change and withdrawal of the objection to the drawings are respectfully requested.

The Office Action rejects claims 1-21 under 35 U.S.C. § 112, second paragraph as allegedly being indefinite. This rejection is respectfully traversed.

First, the Office expressed concerns over the claim language reciting "electrical supplies shifted by 180° so as to reduce the effect of other harmonics." In response, claims 1 and 11 have been amended to even more clearly define this aspect of the invention. In particular, the claims have been amended to recite "each of the stator sections is arranged to receive electricity from an electrical supply such that a first set of $n/2$ of the stator sections will receive electricity that is shifted by 180° electrical relative to electricity received by a second set of $n/2$ of the stator sections." Also, the claim language referring to "reducing the effect of other harmonics than the working harmonics" has been canceled.

The Office also expressed concern over that portion of the claims that recite "an angle related to skew, and then $n/2$ of the stator sections". In response, it is pointed out that the word "skew" is a term of art that refers to an arrangement of laminations on a rotor or armature that provides a slight diagonal pattern of their slots with respect to the shaft axis. This pattern helps to eliminate low speed cogging effects in an armature, minimizes induced vibration in a rotor, and minimizes harmonic stray currents. Thus, no amendment is believed to be necessary since the claims already clearly define that the amount of mutual phase shifting between the stator sections is "substantially $360^\circ/n$ electrical \pm an angle related to skew".

As to the portion of the claim language that recites "... and then $n/2$ of the stator sections", this has been replaced by a "wherein" clause as discussed above.

In view of the foregoing, it is respectfully requested that the rejection of claims 1-21 under Section 112, second paragraph be withdrawn.

The Office Action rejects claims 1-3, 8-12 and 17-21 under 35 U.S.C. § 102(b) as being anticipated by *Burgbacher et al.* (U.S. Patent No. 5,331,245 -- henceforth "*Burgbacher*"). This rejection is respectfully traversed.

The application discloses an electrical induction machine that utilizes multiple stator sections. The stator sections are located in different positions as seen from an axial plane. The electrical supplies associated with the stator sections are mutually phase shifted 180° electrical. The use of stator sections in the particular arrangement above has substantially the same effect as a distributed winding. The higher order harmonics are largely canceled while keeping the benefits of single tooth windings.

Accordingly, independent claim 1 defines a stator for an electrical induction machine, comprising an even number n of stator sections (2, 3) at different axial positions, each section having a plurality of circumferentially separated, radially extending teeth (6, 7) and each tooth having a single winding. Claim 1 further requires that "the stator sections are mutually phase shifted by substantially $360^\circ/n$ electrical \pm an angle related to skew," and also that "each of the stator sections is arranged to receive electricity from an electrical supply such that a first set of $n/2$ of the stator sections will receive electricity that is shifted by 180° electrical relative to electricity received by a second set of $n/2$ of the stator sections."

Independent claim 11 defines an electrical induction machine having a rotor and a stator, wherein the stator is defined to have the features also set forth in claim 1.

Burgbacher fails to anticipate either of claims 1 or 11 because it fails to disclose or even suggest each of the elements define by those claims. To begin with, *Burgbacher* discloses a DC (direct current) motor, not an induction motor as defined in Applicants' claims. Consequently, *Burgbacher* is silent with respect to a stator for an electrical induction machine, which is the subject matter of Applicant's claim 1.

Furthermore, *Burgbacher* discloses a single stator with a single rotor, whereas Applicants' claims define an assembly of an even number of stator sections at different axial positions.

The Office Action relies heavily on *Burgbacher's* figure 9a in support of its rejection. This reliance is unfounded because figure 9a fails to illustrate, nor does the supporting text of *Burgbacher* at column 7, line 62 through column 8, line 47 disclose the

many stator features defined in Applicants' claims including, for example, a stator that comprises "an even number n of stator sections (2, 3) at different axial positions."

The Office Action asserts that reference numeral 320 of *Burgbacher's* Figure 9a discloses multiple stator sections at different axial positions. However, Figure 9a only discloses one stator section. The stator section of Figure 9 has three cut out sections 304, 305 and 306 on the yoke, six stator poles (teeth) 311-316 and cogs 303 that are located on the stator poles. The reference numeral 320, relied on in the Office Action, points to one of a number of slots 317-322 between the stator poles. See column 7, lines 66-67 through column 8, lines 1-2 of *Burgbacher*.

Claims 2-3, 8-10, 12 and 17-21 variously depend from independent claims 1 and 11, and are therefore patentable for at least the reasons set forth above. In addition, these claims define additional features that are neither disclosed nor suggested by *Burgbacher*.

For example, claim 5 requires, *inter alia*, that each stator section be made of several separate units, each unit comprising a tooth and an adjoining part of a yoke of the stator. By contrast, *Burgbacher* describes a multipolar stator.

Also, claim 9 requires that each tooth have a rounded profile. *Burgbacher* is silent with respect to the profile of an individual pole.

It is apparent from the above that *Burgbacher* does not disclose each and every claim element as required to support a rejection under 35 U.S.C. § 102. Accordingly, withdrawal of the rejection is respectfully requested.

The Office Action rejects claims 4-7 and 13-16 under 35 U.S.C. § 103(a) as being unpatentable over *Burgbacher et al.* in view of *Suzuki et al.* (U.S. Patent No. 6,194,806). This rejection is respectfully traversed.

Claims 4-7 and 13-16 variously depend from independent claims 1 and 11, and are patentably distinguishable over *Burgbacher* for at least the reasons set forth above.

Suzuki et al. discloses an iron core cylindrical radial gap motor structure that uses field magnetic poles generated by permanent magnets and salient poles which generate a rotational magnetic field. The salient poles may be made from soft magnetic power. However, *Suzuki* does not disclose or suggest the use of an induction motor which uses multiple stator sections at different axial positions, as claimed by Applicants. Therefore, *Suzuki* does not make up for the deficiencies of *Burgbacher* and therefore, alone or in combination with *Burgbacher*, does not produce Applicants claimed invention. Accordingly, withdrawal of the rejection is respectfully requested.

In view of the foregoing remarks, Applicants respectfully submit that this application is in condition for allowance. Favorable consideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further is desirable in order to place this application in condition for allowance, the Examiner is invited to contact Applicants undersigned representative at the telephone number listed below.

Respectfully submitted,

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Date: June 14, 2001

Attachment to Amendment dated June 14, 2001

Marked-up Copy

Page 3, Paragraph Beginning at Line 34

The yoke sections 4 and 5 are physically phase shifted by 180° electrical \pm an angle that is related to skew (not shown). Their electrical supplies are also shifted by 180° electrical. FIG. 3 illustrates the electrical supplies connected to stator sections 1 and 2 and mutually phase shifted 180° electrical. Further, the stator sections 2 and 3 are separated by a small air gap 10 so as to reduce the mutual influence of the magnetic fields in the two stator sections 2 and 3.

Attachment to Amendment dated June 14, 2001

Marked-up Claims 1 and 11

1. (Amended) A stator for an electrical induction machine, comprising an even number n of stator sections (2, 3) at different axial positions, each section having a plurality of circumferentially separated, radially extending teeth (6, 7) and each tooth having a single winding,

wherein the stator sections are mutually phase shifted by substantially $360^\circ/n$ electrical \pm an angle related to skew,

and [then] wherein each of the stator sections is arranged to receive electricity from an electrical supply such that a first set of $n/2$ of the stator sections will receive electricity that is [have their electrical supplies] shifted by 180° electrical relative to electricity received by a second set of $n/2$ of the stator sections [so as to reduce the effect of other harmonics than the working harmonics].

11. (Amended) An electrical induction machine having a rotor and a stator, wherein the stator comprises an even number n of stator sections (2, 3) at different axial positions, each section having a plurality of circumferentially separated, radially extending teeth (6, 7) and each tooth having a single winding, wherein the stator sections are mutually phase shifted by substantially $360^\circ/n$ electrical \pm an angle related to skew and wherein each of the stator sections is arranged to receive electricity from an electrical supply such that a first set of $n/2$ of the stator sections have their electrical supplies shifted

Attachment to Amendment dated June 14, 2001

Marked-up Claims 1 and 11

by 180° electrical relative to electricity received by a second set of n/2 of the stator
sections [so as to reduce the effect of other harmonics than the working harmonics].